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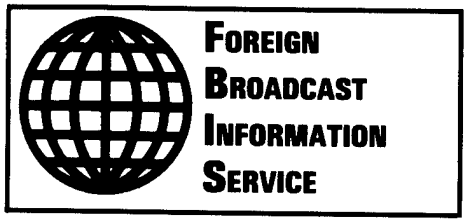

JPRS Report

Science & Technology

USSR: Life Sciences

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18400160a Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHIMII I FIZIOLOGII in Russian Vol 23, No 5, Sep-Oct 87 (manuscript received 17 Jun 86) pp 575-581

[Article by M.A. Ostrovskiy, N.L. Sakina and A.Ye. Dontsov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] The ability of melanosomes to inhibit lipid photooxidation processes was investigated. Two principal mechanisms were studied: passive optical screening and active chemical inhibition of photooxidative processes. Retinal pigment epithelium and retinas were obtained from eyes of guinea pigs. Lipid oxidation rate was determined by accumulation of malonic dialdehyde in the incubation medium. The results obtained have shown that melanosome does act by both of the studied mechanisms: as a physical screen and as chemical oxidation inhibitors. The latter occurs by binding prooxidation ions and by reacting with toxic oxygen radicals (superoxide anion radical). The same mechanisms are evidently responsible for photoprotection of other tissues, notably skin. Figures 5; references 14: 10 Russian, 4 Western.

7813/9604

Synthons for 11-Desoxyprostaglandins Based on 2-Acetylcyclopentane-1,3-Dione and 3-Acetyltetronic Acids

18400160b Minsk VESTSI AKADEMII NAVUK BSSR:SERYYA KHIMICHNYKH NAVUK in Russian No 5, Sep-Oct 87 (manuscript received 29 Apr 87) pp 53-59

[Article by F.A. Lakhvich, E.S. Pashkovskiy and L.G. Lis, Institute of Bioorganic Chemistry, BSSR Academy of Sciences]

[Abstract] A new approach to synthesis of cyclopentane prostaglandin (PG) synthons and their heteroanalogs was reported based on 2-acetylcyclopentane-1,3-dione, 3-acetyltetronic acid and 3-acetyl-5-methyltetronic acid. Formation of the prostanoid alpha chain occurs through condensation, with furfural, of accessible β-tricarbonyl compounds acetyl groups. When piperidine is used as a base in this reaction, it gives high yields of the product. PG synthons were thus obtained with an enone fragment in the cyclic portion of this molecule and a semihydrocarbon fragment in the side chain which could be converted into a natural or modified dione of PG. Also synthons with an aromatic cycle in the alpha chain could be obtained. Basically, the synthesis involves condensation of 2-acetylcyclopentanedione with furfural, followed by reduction, preparation of a β-diketone enol ester and its reduction to the enone. References 13: 6 Russian (1 by Western authors), 7 Western.

7813/9604

Mechanism of Action of Individual Components of Levorin and Nystatin With Membrane Lipids

18400186 Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHNOLOGIYA in Russian Vol 32, No 11, Nov 87 (manuscript received 25 Jun 86) pp 824-828

[Article by Kh.M. Kasumov, A.A. Samedova and Yu.D. Shenin, All-Union Scientific Research Technologic Institute of Medically Useful Antibiotics and Enzymes, Leningrad; Section of Physicochemical Biology, Institute of Physics, Azerbaijan SSR Academy of Sciences, Baku]

[Abstract] Electrophysiological studies were conducted with bilayer lipid membranes exposed to nystatin and candidicin (Levorin) components to assess the putative mechanism of action of these polyene antibiotics. Exposure of the membranes (prepared from total bovine brain phospholipids + cholesterol) to nystatin components A_1, A_2, A_3, and B_1 demonstrated that each was active in sharply increasing membrane conductivity and permeability. Nystatin A_3-induced channels had a lifetime much shorter than those formed by the other components. Despite marked structural differences between the hydrophobic fragment of molecules A_1 and A_3, both interacted when placed on opposite sides of the lipid membrane to form ion channels, one half of the channel being formed by the A_1 molecule, and the other half of the channel by the A_3 molecule. Furthermore, nystatin A_1 and B_1 formed channels showing selective permeability for anions, whereas channels formed by nystatin A_2 and A_3 were equally permeable to K^+ and Cl^-. Similar studies with candidicin components, differing in terms of the number of hydroxyl groups per molecule, demonstrated that their effects on the lipid membrane parallel their biological activity and which, in activity, rank as follows: A_4 [is greater than] A_3 [is greater than] A_2 [is greater than] A_1 [is greater than]A_0. This agreement substantiated the bilayer lipid membrane as a suitable model system for monitoring cell membrane effects. The effects of the candidicin components were both dosage- and membrane potential-dependent. Application of a 200 mV potential with the negative side facing the antibiotic solution failed to result in an increase in conductivity. The candidicin molecules showed cation-selective permeability falling into the following series: Cs^+ [is greater than] Li^+ [is greater than] K^+ [is greater than] Rb^+ [is greater than] Na^+. Figures 4; references 16: 8 Russian, 8 Western.

Electrically Stimulated Cell Fusion in Cell Engineering

18400169a Moscow BIOFIZIKA in Russian Vol 32, No 5, Sep-Oct 87 (manuscript received 13 Apr 87) pp 874-887

[Article by L.M. Chaylakhyan, B.N. Veprintsev, T.A. Sviridova and V.A. Nikitin, Institutes of Information Transfer Problems (Moscow) and of Biological Physics (Pushchino, Moscow Oblast), USSR Academy of Sciences; All-Union Scientific Research Institute of Physiology, Biochemistry and Nutrition of Farm Animals, All-Union Agricultural Academy imeni Lenin, Borovsk]

[Abstract] The techniques of cell fusion have been considerably expanded by the development of methods utilizing electrical stimulation, a development that offers many advantages over methods utilizing polyethylene glycol or infection with Sendai virus. Electrically stimulated cell fusion has been used successfully with both animal and plant cells and is gaining increasing acceptance because of the relative ease of the operation and considerable experimental control over the outcome, as well as the high success rate. The efficiency of electrical stimulation in promoting cell fusion was demonstrated in studies on preparation of mouse zygotes by fusing enucleated zygotes with nucleoplasm. Optimal conditions for fusion were attained with insulated tungsten electrodes (except for the tips), with a 70-100 μm diameter tip facing the enucleated zygote, and a 20-30 μm diameter tip in contact with the nucleoplasmic membrane. A 75 percent fusion rate was attained with a 20 V potential across a distance of 100-150 μm for 0.1 msec. Uninsulated electrodes yielded a 25 percent fusion rate. Fusion occurred within 1 sec to 30 min after electrical stimulation in Whitten's solution. An additional one to two pulses often led to fusion of cells that failed to fuse after one stimulation. Additional factors that favored fusion by this method were the presence of cytochalasin B in a concentration of 5 μg/ml, and dilution of the medium by 20-30 percent with distilled water. The transfer CBWA mice zygotes prepared in this manner into F_1(CBA x C57) female mice resulted in viable CBWA progeny. These mammalian studies demonstrated that there were no apparent changes in the genome, confirming the utility of electrically stimulated cell fusion in cell engineering. Figures 5; references 57: 21 Russian, 36 Western.

12172/9604

Photooxidation in Ocular Structures: Protective Functions of Crystalline Lens and Screening Pigments

18400169b Moscow BIOFIZIKA in Russian Vol 32, No 5, Sep-Oct 87 (manuscript received 11 Apr 87) pp 896-909

[Article by M.A. Ostrovskiy, I.B. Fedorovich and A.Ye. Dontsov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] An analysis was conducted on the factors primarily responsible for the protection of the rhodopsin-containing photoreceptor membrane (retina) from photoinjury. Such protection has evolved in view of the fact that all-trans-retinal is an effective photosensitizing agent promoting oxidation of amino acids, proteins and lipids. The two-stage protective system in the eye makes it possible for the photoreceptors to function normally when exposed to illumination levels exceeding threshold levels by ca. ten-fold. The first line of protection is afforded by the crystalline lens that filters out UV and blue light, potentially-damaging radiation to the retinal system. The second line of defense involves screening pigments in the melanosomes of the vertebrate eyes and ommophores in the invertebrate eye. In addition to passive absorption of UV light, the pigments have also been shown to function as antioxidants. The importance of these two lines of defense lies in the fact that oxidation of the thiol groups leads to the formation of free radicals. In addition, oxidation of the -SH groups on rhodopsin leads to formation of intra- and intermolecular S-S bonds, resulting in aggregation of rhodopsin molecules. The irreversible aggregation of rhodopsin results in segregation of the protein and lipid phases in the retina, a form of molecular pathology normally prevented by the crystalline lens and the screening pigments. Figures 15; references 67: 50 Russian, 17 Western.

12172/9604

Physical Models of Neural Networks

18400169c Moscow BIOFIZIKA in Russian Vol 32, No 5, Sep-Oct 87 (manuscript received 5 Feb 87) pp 918-928

[Article by A.V. Lukashin, A.A. Vedenov and M.D. Frank-Kamenetskiy, Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] A cursory description is provided of the use of the parallel associative memory models [Hopfield, JJ, Proc. Nat. Acad. Sci. USA, 79: 2554, 1982] for modeling neural networks and network-based higher nervous functions, such as may be used to simulate the human brain. Proceeding from simple systems in which short-term and long-term memory mechanism are relatively easy to define in terms of synaptic interconnections and biochemical mechanisms, including effector molecules acting on DNA in long-term memory, a bilayer model has been devised for associative memory. The interaction between the two layers, representing synaptic memory matrices, has been shown to provide a fairly realistic model of neural networks that may be interpreted as being capable of performing such functions as image recognition, learning, classification, prototype development, and so forth. The interrelationships between these two layers within the framework of relaxation results in the establishment of a large number of novel, stable relationships that may be regarded as generation 'ideas.' A full discourse of this approach to the elements of

mentation is presented in the monograph by A.A. Vedenov [Modelirovaniye Elementov Myshleniya (Modeling Elements of Thinking), Mir, Moscow, 1987]. References 40: 5 Russian, 35 Western.

12172/9604

Effects of Temperature on EPR Spectra of Triplet State of Bacteriochlorophyll in Photosystem Centers of Phototrophic Bacterium Rhodobacter Sphaeroides R-26

18400168 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 297, No 5, Dec 87 (manuscript received 15 May 87) pp 1250-1252

[Article by I.I. Proskuryakov and Kh. Manikovski (Ch. Manikowski), Institute of Soil Sciences and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast, USSR; Poznan Polytechnic Institute, Poland]

[Abstract] An attempt was made at the first study of the effects of temperature on the EPR spectra of bacteriochlorophyll (Bchl) in the triplet state, using chromatophores isolated from Rhodobacter sphaeroides R-26 (carotenoid-free mutant) to ensure photosystem centers in a membrane situation resembling the native system. The chromatophores were obtained by a method involving ultrasonication of the bacterial cells, followed by centrifugation. The EPR signal detected from Bchl in the triplet state was analyzed to provide information on the molecule and its environment, since splitting of the triplet state levels in zero field (zero-field splitting) is indicative of molecular status. The zero-field splitting constant was measured over a temperature range of 20 to ca. 280 K, showing an increase in the constant starting at a temperature of ca. 120-140 K. The temperature effects were explained by assuming a thermoactivation of triplet-triplet energy transfer from Bchl dimer in the triplet state to Bchl monomer. These findings corroborate observations made on isolated photosystem centers, indicating that this phenomenon does not depend on environmental factors but on internal factors in the centers. The energy gap between the triplet states of these molecules is about 0.02-0.03 eV. Figures 2; references 12: 2 Russian, 10 Western.

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Fertile Nucleated Intertribal Hybrids of Nicotiana + Atropa Produced by Fusion of Normal and Radiation-Inactivated Somatic Cells

18400188 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 297, No 6, Dec 87 (manuscript received 11 Nov 87) pp 1473-1475

[Article by Yu.Yu. Gleba, V.A. Kaleda, A.S. Parokonnyy, N.V. Borisyuk, S.V. Lopato, I. Negrutiu* and M. Jacobs*, Institute of Botany imeni N.G. Kholodnyy, Ukrainian SSR Academy of Sciences, Kiev; *Institute of Molecular Biology, Free University of Brussels, Belgium]

[Abstract] Description is provided of the production of fertile intertribal Nicotiana + Atropa hybrids by protoplast fusion, with prior elimination of most of the chromosomes of one of the parental strains by gamma-irradiation. Fusion of the Nicotiana plumbaginifolia (2n = 20) and Atropa belladonna (2n = 72) protoplasts was preceded by irradiation of the latter with a dose of 100 to 1000 Gy from a Co-60 source. Subsequent cultivation on a selective medium for several days yielded colonies of hybrid cells, with the percentage of prototrophic colonies ranging from 0.7 to 3.9 percent. Cytogenetic analysis of plants regenerated from prototrophic cells showed them to be asymmetrical nuclear hybrids. In addition to a tetraploid set (2n = 40) of large telocentric chromosomes typical of Nicotiana, the studies also revealed various hypohaploid (2n = 6-29) sets of small chromosomes characteristic of Atropa. Analysis of 40 clones for multimolecular forms of proteins revealed that in a number of cases the genetic material of the irradiated parent was expressed. In the final analysis, the approach used here was found to be suitable for plant engineering and the construction of hybrids from distant species. Figures 1; references 14: 2 Russian, 12 Western.

12172/9604

Chromosomal Analysis of Grain Crops: Theoretical and Practical Aspects

18400171a Moscow GENETIKA in Russian Vol 23, No 10, Oct 87 (manuscript received 19 Mar 87) pp 1749-1761

[Article by A.V. Zelenin, Ye.D. Badayeva and N.S. Badayev, Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] A review is presented of the current advances in karyotype analysis of grain crops, concentrating on C-banding studies conducted at the Laboratory of Functional Chromosomal Morphology at the Institute. The universal application of this approach has been shown by studies conducted on the chromosomes of rye, di-, tetra- and hexaploid wheat, tetra-, hexa- and octoploid triticale, barley, aegilops, corn and, even, cow parsnip. The data indicate that differential staining may be applicable to all plants, provided that chromosomal size is sufficiently large to be visible by light microscopy. The construction of chromosomal ideograms into A, B, D and H genomes has been another landmark in karyotypic analysis, with extensive collections of ideograms now available for barley, rye, triticale, and wheat of various derivations. More recent developments have included quantification of DNA by means of cytophotometry, as well as in situ hybridization studies that define selected sequences on DNA or RNA. A more intimate understanding of the plant genome will facilitate better utilization of the genetic potential of a given plant and the breeding of new varieties. Figures 5; references 62: 24 Russian, 38 Western.

12172/9604

Molecular Genetics and Origin of Plasmid pBS52 With Broad Bacterial Host Spectrum

18400171b Moscow GENETIKA in Russian Vol 23, No 10, Oct 87 (manuscript received 5 Dec 86) pp 1823-1831

[Article by B.V. Polevoda, T.V. Tsoy and A.M. Boronin, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Plasmids with a broad host range are of particular importance in bringing additional gram-negative bacteria within the spectrum of biotechnology, and in that respect plasmid pBS52—isolated from a clinical specimen of Ps. aeruginosa—appears to merit more extensive studies. Plasmid pBS52 belongs to a new incompatibility group. Detailed restriction enzyme analysis of pBS52 and its derivatives has led to mapping of the sequence of restriction sites in the 200 bp polylinker region as follows: BamHI-EcoRI-PstI-EcoRV-BgIII (PvuII). Hybridization studies have shown that the streptomycin resistance determinant—gene APH(3")—is located on the pBS52 map at 6.9-8.3 tbp, the sulfanilamide resistance gene (DNPS-II) at sequence 6.1-6.85 tbp, and the ampicillin resistance gene (TEM-beta-lactamase) at 8.5-13.5 tbp. The plasmid pBS52 was also demonstrated to possess segments homologous to plasmids RSF1010 and pBS96 (IncP-4); furthermore pBS96 was also isolated from the same Ps. aeruginosa strain as pBS52. Transformation of E. coli with the DNA of pBS52 resulted in recA-independent formation of mini-derivatives of pBS52, designated pBS373 and pBS374. Both pBS373 and pBS374 are capable of autonomous replication in Ps. aeruginosa and Ps. putida due to functional IncP-4 rep genes. Figures 5; references 21: 7 Russian, 14 Western.

12172/9604

Integration and Expression of Human Dihydrofolate Reductase Gene in Bacillus Subtilis Chromosome

18400171c Moscow GENETIKA in Russian Vol 23, No 10, Oct 87 (manuscript received 24 Feb 87) pp 1839-1846

[Article by Ye.U. Poluektova, G.V. Savchenko, V.Z. Nezametdinova, F.K. Khasanov and A.A. Prozorov, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] A series of integrative vectors were constructed from plasmids and phages to use as vectors for the insertion of human dihydrofolate reductase (hDHFR) gene into the Bacillus subtilis chromosome. The hDHFR gene was linked with a promoter and SD sequence of chloramphenicol acetyltransferase (CAT) gene of Staphylococcus aureus pC194 plasmid. The resultant transformed Bacillus subtilis cells contained one to seven copies of the hDHFR gene per one chromosome equivalent. Furthermore, the clones were resistant to the effects of trimethoprim. Ultrasonic lysates of the cells yielded a protein with the MW on electrophoretic analysis of a CAT-hDHFR complex. The hDHFR gene activity was stable in the transformed cells grown on nonselective media. These findings suggest the superiority of such an approach in securing bacterial production of the products of eukaryotic cells. Figures 4; references 19: 7 Russian, 12 Western.

12172/9604

Inheritance of Resistance to Brown Rust in Selected Cultivars of Winter and Spring Wheat

18400189 Moscow GENETIKA in Russian Vol 23, No 11, Nov 87 (manuscript received 18 Aug 86) pp 2047-2053

[Article by L.A. Mikhaylova, L.G. Tyryshkin and T.G. Derova, All-Union Scientific Research Institute of Plant Protection, Leningrad]

[Abstract] A study was conducted on the inheritance of resistance to brown rust in selected cultivars of winter and spring wheat on the basis of segregation in the F_2

generation and determination of R:S ratios (R = resistant, S = susceptible). The study involved winter wheat cultivars No 30432 (Rumania), F1-1331 and F_2H-296 (Hungary), and Parker, Parker 5, Co 725049, Co 725055, Co 725082, Purdue 6693, GKB1 and GKB10 (USA), and spring wheat varieties Inia 66 (India), Pringllal (France), and No 710 (Brazil). Crossings were conducted among these varieties, as well as with resistant Thatcher lines carrying resistance genes Lr9, Lr19, Lr23, and Lr24, and with the susceptible cultivar Saratovskaya 29. The plants were tested by infection with spores from either the Derbent (Daghestan) or Zernograd (Rostov Oblast) isolates of the pathogenic fungus. Analysis of the resistance data demonstrated that cultivar No 30432 possessed a gene identical in behavior with gene Lr19, and cultivar Purdue 6693 a gene that is closely linked to Lr19. In addition, GKB1 and GKB10 possess gene Lr9, while Inia 66 and Pringllal have Lr23. Cultivars Parker, Parker 5, and F_2H-6693 possess either alleles of the same gene or closely linked genes that differ from the genes in the Thatcher lines. Furthermore, cultivars Co 725049, Co 725055, Co 725082, and F1-1331 possess resistance genes that differ from those of the Thatcher lines. The genes of this category of cultivars were equally protective against both strains of pathogens. However, two genes offer protection against the Zernograd pathogen and only one gene against the Derbent strain in Co 725049, Co 725082, Parker 5, and F1-1331. Finally, in some cases genes that behaved as dominant with respect to the Zernograd pathogen behaved as recessive genes vis-a-vis the Derbent pathogen, and cultivar No 710 exhibited only one dominant gene offering protection only against the Zernograd pathogen. References 6 (Russian).

12172/9604

Use of Recombinant Plasmid RP4gQelt in Localization of Structural Genes of Cholera Toxin on Vibrio Cholerae Cholerae Chromosome

18400170a Moscow GENETIKA in Russian Vol 23, No 9, Sep 87 (manuscript received 30 Jul 86) pp 1581-1587

[Article by N.M. Yevdokimova, V.I. Zakharenko, G.I. Aleshkin, I.V. Andreyeva and A.G. Skavronskaya, Scientific Research Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] In view of the fact that the classical cholera vibrio El Tor genes for the cholera toxin (CT) appear to be located at two different sites on the chromosome, a recombinant plasmid RP4gQelt was constructed for use in such localization studies. The advantage of RP4gQelt was that it carries the gene for the heat-labile enterotoxin of E. coli (elt), with the genes for CT and elt previously shown to have 70-80 percent homology. The basic assumption was that in conjugation studies between V. cholera 569B/RP4gQelt donors and RV31 and RV175 recipients, RP4gQelt will recombine with the bacterial chromosome due to the region of homology. The donors were classified into two categories transmitting trp-1 or ilv-1-lys-1 genes with greater efficiency, corresponding to the contention that in classical vibrio biotype there are two regions of localization for the structural genes of CT. Therefore, in V. cholera 569B one of the operons for CT is located in the trp-1 region and the other in the ilv-1—lys-1 linkage group. Figures 1; tables 2; references 17: 5 Russian, 12 Western.

12172/9604

Diallele Analysis of Frost Resistance in Winter Wheat

18400170b Moscow GENETIKA in Russian Vol 23, No 9, Sep 87 (manuscript received 11 Nov 85; in final form 26 May 86) pp 1604-1612

[Article by R.A. Urazaliyev and I.A. Nurpeisov, Kazakh Scientific Research Institute of Soil Science imeni V.R. Vilyams, Alma-Ata]

[Abstract] Studies on diallele analysis of frost resistance in winter wheat are summarized in relation to period of study (1977-1979), environmental conditions (snow cover, temperatures of -14 to -19°C), and generation (F_1 and F_2). The studies involved diallele crossings between the following varieties: Krasnovodopadskaya-210, Alma-Ata semidwarf, Dneprovskaya-521, Priboy, Bezostaya-1, Kharkovskaya-38, Alma-Ata-31, and Mironovskaya-808. The data revealed an additive-dominant type of inheritance for frost resistance. The predominance of additive and dominant genes in the pure varieties and their hybrids is evident under a variety of extreme environmental conditions. Furthermore, in the F_1 hybrids, the effects of nonadditive genes predominate, whereas in the F_2 generation the predominant role is exercised by additive genes. Tabulated data depicted the differences among the varieties in term of the number and nature of the involved genes, as well as in terms of expressivity of dominant and recessive alleles. Tables 4; references 25: 13 Russian, 12 Western.

12172/9604

Experimental Evaluation of Anatoxin Complex Prepared from Ps. aeruginosa and Cl. tetani

18400172 Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 49, No 5, Sep-Oct 87 (manuscript received 14 Jan 86) pp 55-58

[Article by L.G. Podgornaya, N.F. Dzyuban, N.F. Kalinichenko and S.Ya. Isayeva, Kharkov Scientific Research Institute of Microbiology, Vaccines and Sera]

[Abstract] Outbred albino mice were employed in an evaluation of an anatoxin complex prepared from the anatoxins of Ps. aeruginosa and Cl. tetani, since earlier studies had demonstrated that Ps. toxin may also function as an adjuvant for other toxins. Subcutaneous immunization of the mice with a mixture of the anatoxins (0.1 or 0.5 ml Ps. aeruginosa anatoxin + 0.1 ml tetanus anatoxin) and challenge in 14 or 21 days later either with Ps. aeruginosa culture (i.p.) or tetanus toxin (i.m.) resulted in a 75-89 percent survival rate. Such animals subsequently cross-challenged again demonstrated high survival rates of 73-86 percent. Cross-protection, however, was not offered by the monovaccines. These observations demonstrated that complex anatoxin preparations containing the Ps. aeruginosa anatoxin and tetanus anatoxin retain immunogenic potency and do not interfere with the antigenicity of the other toxin. References 8 (Russian).

12172/9604

Role of Critical Light Flashing Fusion Frequency in Evaluation of Labor Intensity of Seamen

18400161 Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 5, 1987 (manuscript received 19 Jun 86) pp 300-303

[Article by O.Yu. Netudykhatka, Branch of Scientific Research Institute of Water Transportation Hygiene, USSR Ministry of Health, Odessa]

[Abstract] Critical flash fusion frequency (CFFF) is the minimal frequency of light flashes per second at which the light appears to be continuous. It reflects processes occuring in the retina as well as in the CNS. This value changes during the working day and characterizes the general state of fatigue, the ability to perform various tasks adequately and reflects the general state of the oxidation-reduction processes in the human body. Examination of 237 seamen by this method showed that it reflected their ability to perform various tasks during a given work period as well as during the cruise. This value is different for different jobs depending on mental stress required to perform various tasks. Results derived from CFFF compared favorably with other methods of fatigue determination: static tremor, Bayevski tension index or adrenaline levels in urine. References: 8 Russian.

7813/9604

Mechanism of Effect on Heart of Helium-Neon Laser Radiation

18400162a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 87 (manuscript received 2 Sep 86) pp 81-83

[Article by L.V. Mikhaylova, B.S. Agov, S.B. Koneva and Ye.S. Yevstifeyeva, Departments of Human Physiology (Chairman: R.S. Orlov) and Internal Medicine (Chairman: B.I. Shulutko), Leningrad Sanitation-Hygienic Medical Institute]

[Abstract] Irradiation with a He-Ne laser is used effectively in treatment of stenocardia. This effect could be related to lowering of the intracellular concentration of Ca^{2+} and Na^{+} ions. To verify this hypothesis, model experiments on the ventricular myocardium of a frog's heart were performed using microelectrode techniques. It was shown that red light of the He-Ne laser beam affected the penetrability of myocardiocyte membranes to Na^{+} and Ca^{2+} ions which was reduced during the depolarization phase and K^{+} ions which was increased in the phase of repolarization. A single direct exposure of the myocardium to the laser beam or repeated (5-10 times) irradiation of the chest wall of an intact animal had about the same effect. Figures 2; references 6 (Russian).

7813/9604

Effect of Laser Radiation on Posttraumatic Restoration of Interneuronal Connections of Sympathetic Trunk

18400162b Leningrad ARKHIV ANATOMII, GISTOLOGII I EMERIOLOGII in Russian Vol 93, No 9, Sep 87 (manuscript received 10 Apr 87) pp 58-63

[Article by A.R. Rakhishev and B.Sh. Usupbekova, Department of Human Anatomy (Chairman: A.R. Rakhishev) of the Therapeutic and Stomatologic Faculties, Alma-Ata Medical Institute]

[Abstract] The goal of this study was to investigate the effect of a low energy laser on the course of posttraumatic regeneration of sympathetic trunk axons and interneuronal connections in the cranial cervical ganglions (CCG); also attempted was identification of initial spinal cord neurons which facilitate regeneration of synapses. The work was performed on adult cats using a PBL-4 He-Ne laser. It was shown that this low energy laser irradiation stimulated posttraumatic regeneration of interneuronal connections of the sympathetic trunk. Reparative regeneration of the experimental cats' CCG was markedly accelerated, occurring 5-6 days earlier than restoration in the control group which was not irradiated. Figures 3; references 21: 8 Russian, 13 Western.

7813/9604

Use of Excimer Lasers in Refractive Corneal Surgery

18400163a Moscow VESTNIK OFTALMOLOGII in Russian Vol 103, No 5, Sep-Oct 87 (manuscript received 7 Aug 87) pp 45-48

[Article by L.L. Shotter, candidate of medical sciences, R.P. Tamkivi, candidate of physical mathematical sciences, T.I. Klementi, candidate of technical sciences, P.L. Kukk and T.A. Pakhomova, Laboratory of Sight Protection (Director L.Kh. Shotter), Tartu University; Institute of Physics and Specialized Design Bureau of EstSSR Academy of Sciences (Director K.K. Rebane); All Union Scientific Research Institute of Eye Diseases (Director M.M. Krasnov) USSR Ministry of Health, Moscow]

[Abstract] Excimer lasers use a mixture of inert and halogen gases as the active medium. They produce pulses with a wavelength ranging from 150 to 350 nm. Irradiation with less than 200 nm wavelength produces a specific nonthermal disintegration effect on biological tissue such as cornea. The goal of this study was to verify this surgical applicability of excimer lasers and to determine energy levels and focusing conditions required to achieve the desired incisions. Experiments were done with an ELI-3 laser using XeCL (308 nm), KrF and ArF (248 and 193 nm, respectively) gases and working with isolated pig eyes. Histological analysis of incisions showed that the laser with 308 nm wavelength led to definite burns along the edge of the incisions; with the 248 nm laser this damage was much less pronounced and with the 193 nm laser there was no thermal damage around the incisions noted. Thus it was shown that this laser technology could be applied to ocular surgery, especially the ArF beam. Figures 2; references 6: 2 Russian, 4 Western.

7813/9604

Argon Laser Photocoagulation in System of Combined Organ Preserving Treatment of Pediatric Retinoblastomas

18400163b Moscow VESTNIK OFTALMOLOGII in Russian Vol 103, No 5, Sep-Oct 87 (manuscript received 10 Sep 86) pp 61-64

[Article by N.V. Makarskaya, candidate of medical sciences, A.V. Khvatova, professor, and V.V. Zheludkova, candidate of medical sciences, Moscow Scientific Research Institute of Eye Diseases imeni Helmholts (Director E.V. Yegorova)]

[Abstract] The goal of this study was to establish the role of laser therapy in the overall therapeutic strategy for pediatric retinoblastoma: should it be independent or a combined modality? It was concluded that laser photocoagulation should be used to coagulate residual tumor tissue after x-ray and chemotherapy. The argon laser, in contrast to a xenon source, does not affect the surrounding, normal tissue. In contrast to photocoagulation there

is no tumor-particle scattering with the laser coagulation. Laser coagulation was not found to be effective in treating widely spread retinoblastomas involving the hyalic membrane and optical nerve disc. The first step in laser therapy involves creation of a barrier around the tumor followed by gradual closing off of vessels feeding the tumor from the periphery towards the center. References 12: 4 Russian, 8 Western.

7813/9604

Wettability of Fur Coat of Northern Seal

18400174 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 297, No 4, Dec 87 (manuscript received 27 May 87) pp 990-994

[Article by Ye.V. Romanenko and V.Ye. Sokolov, academician, Institute of Evolutionary Morphology and Ecology of Animals imeni A.N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] An analysis was conducted on the wettability of body and down hairs of the Northern seal to determine the factors responsible for retention of an air layer on the body on deep dives. Generally, the underlying assumption has been that hydrophobicity of the fur coat may be attributable to secretions of the sebaceous and sweat glands. Wettability studies on down hairs with distilled water and salt water (ca. 14°) yielded an identical contact angle of ca. 130° all along the length of the hair in an inleakage situation. In the case of body hairs, the foot of the hair had an angle of ca. 90°, and the top deflected part of ca. 20°C. In outleakage situations both types of hairs showed high wettability with contact angles of almost 0°. Washing the hairs with ethanol had no effect on the results. The data were interpreted to indicate that the wettability characteristics of the hair and their thickness favored retention of air by capillary action, and prevented water from entering the down cover. Secretions of the sebaceous and sweat glands appear to have no significant role in maintaining the hydrophobic characteristics of the fur coat. Figures 3; references 9 (Russian).

12172/9604

Potential for Improvement of Quality of Preserved Blood by Use of Activated Carbon Fibers

18400175 Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 32, No 11, Nov 87 (manuscript received 5 Mar 86) pp 58-61

[Article by K.Ya. Gurevich and O.A. Portnoy, Military Medical Academy imeni S.M. Kirov, Leningrad; Leningrad Branch, All-Union Scientific Research and Design Institute of Synthetic Fibers]

[Abstract] Trials were conducted with activated carbon fibers with different porosities to test their usefulness in hemosorption as a means of improving the quality of preserved blood. Adsorption studies with 15-20 day-old donor blood showed that processing in this manner resulted in a decrease in the numbers of erythrocytes, echinocytes, leukocytes, and—insignificantly—of lymphocytes. A statistically significant decrease was also seen in total proteins and in fibrinogen; glucose levels were also reduced, as was residual nitrogen (particularly with activated carbon #3). The pCO_2 of the treated blood samples was depressed, while pO_2 was increased without, however, any changes in pH. Plasma levels of potassium were decreased, while the potassium of erythrocytes was increased. Activated carbon fibers identified as #3 yielded the most favorable changes in the donor blood, and also reduced the counts of microaggregates from 1,175.00 [plus or minus] 44.26 to 300.12 [plus or minus] 50.64. Activated carbon #3 was, therefore, identified as the most efficient and cost-effective method for improving the qualities of preserved blood, requiring only 0.5 g carbon #3 per 500 ml of blood. Figures 2; references 22: 13 Russian, 9 Western.

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Long Distance Satellite Transmission of EKG Signals During Extended Sea Cruises

18400201 Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 11, Nov 87 (manuscript received 26 Jan 87) pp 45-46

[Article by V.A. Shelukhin, L.I. Bobkova, N.I. Golovlev and G.G. Novikov, Baltic Central Basin Hospital imeni G.I. Chudnovskiy, Leningrad Emergency Medical Aid Station (Skoraya meditsinskaya pomoshch)]

[Abstract] Cardiovascular disorders among the fleet personnel are among the leading causes of loss in the labor force. Even though most of the ships are equipped with EKG instruments, the interpretation of the graphs and differential diagnosis require expert opinions. In the past, a radio network was used for this purpose but for obvious reasons this was not satisfactory. The USSR is a member of the global satellite network INMARSAT which covers most of the skies and does not depend on meteorological conditions. In 1984 this system was evaluated by long distance communication aboard the ship "Aleksandr Pushkin" which was sailing at that time in the Indian Ocean. Later transmissions were attempted from the following ships: "Ilich," "Anatoliy Vasilev," "Mikhail Kalinin" and others. This proved to be an effective communication for routine examination of ship's crew during extended cruises.

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Fungal Biodegradation of Paint and Varnish Coatings on Metals

18400176a Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 49, No 5, Sep-Oct 87 (manuscript received 31 Oct 86) pp 81-84

[Article by A.I. Sidorenko, E.Z. Koval and L.P. Sidorenko, Institutes of Colloid Chemistry and Water Chemistry and of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the susceptibility of various paints and varnish coats on metal surfaces to fungal biodegradation. Evaluation of extensive data demonstrated that the various primers and enamels employed on aluminum alloys D16, AM_g, AM_{ts}, and Al-9 and on titanium alloys VT-5 and VT-10 were affected, to some extent at least, by the process of biodegradation. In general, 70-100 percent of the responsible agents were represented by Aspergillus flavus and A. niger. The incidence of Penicillium funiculosum and P. ochro-chloron did not exceed 10 percent on any one occasion. The greatest degree of fungal resistance was encountered with alloy Al-9 treated with primer EF-0137 and gray enamel ML-12, as well as by titanium alloys primed with VL-02 and black enamel EF-1118m. Microbiological growth monitoring demonstrated that condensation favored fungal growth on the coating materials. In general, only one fungal species could be identified on a given alloy. However, in the case of alloys D16 and AM_g united effects were noted in the case of certain combinations of paints and varnish (eg, A. flavus + A. niger, or A. flavus + A. niger + P. funicolosum). References 14: 10 Russian, 1 Czech, 3 Western.

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Inhibition of Micromycete Growth in Semisynthetic 'Avtokat' Lubricant-Coolant

18400176b Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 49, No 5, Sep-Oct 87 (manuscript received 14 Jul 86) pp 85-89

[Article by Z.M. Kartavtseva, E.Z. Koval and V.A. Kalaganov, Lubricant-Coolant Laboratory, KaMAZ [expansion unkown], Brezhnev; Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Monitoring studies were conducted on microbial contamination of the semisynthetic Avtokat lubricant-coolant, in order to determine measures that may be taken to prevent such problems. Studies with 3 percent Avtokat emulsions containing 0.3 percent concentrations of biocidal additives demonstrated that best results were obtained with morpholine. Morpholine prevented an increase in bacterial and fungal counts from rising over a ca. 10 week period. However, despite the positive effects in controlling the degree of micromycete and bacterial contamination, one had to be alert to the fact that resistant strains may arise. The latter phenomenon requires constant monitoring for selection of new antimicrobial agents whenever necessary. References 11: 6 Russian, 5 Western.

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Construction and Properties of Artificial Polycistrons Containing Truncated E. Coli Tryptophan Operon Gene and Phage M13 Coat Protein Gene

18400178a Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13, No 9, Sep 87 (manuscript received 31 Dec 86) pp 1176-1185

[Article by V.V. Kravchenko, I.P. Gileva, V.V. Shamin, V.A. Kulichkov, V.N. Dobrynin*, S.A. Filippov*, S.A. Chuvpilo* and V.G. Korobko*, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast; *Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] A series of plasmid vectors were constructed with the purpose of preparing artificial polycistrons, using plasmid pDSlt $_0$ / $^{2+}$ with cloned fragments of E. coli and phage M13 DNA. The cloned DNA fragments consisted of the leader peptide gene of the E. coli (HhaI-140 tandem fragment) and phage M13 coat protein gene (TaqI-381 and HaeIII-1623 fragments). The vectors designed for the expression of these genes were designated pGS280, pDS381, and pDS1623, containing promoters p_{trp}, p_{VIII}, and p_{V+VIII}, respectively. An artificial gene for human leukocytic interferon (alpha-2 INF) was cloned into the plasmids in a manner designed to insure transcription within the corresponding polycistronic mRNA, with termination of the synthesis of the protein preceding IFN occurring before the ribosome binding site and initiation of translation of the IFN gene. E. coli cells carrying plasmids bearing the IFN gene showed high levels of IFN synthesis. In the case of IFN synthesis controlled by the transcription and translation signals of the M13 gene, the length of the polycistronic mRNA affected the level of expression of the IFN gene, a factor attributed to translational coupling. Highest levels of IFN synthesis (67μ) were obtained with E. coli cells carrying plasmids p280-IFN. Figures 5; references 24: 6 Russian, 18 Western.

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Duplication of Artificial Gene for Human Leukocytic Interferon and Its Expression Within Polycistronic mRNA in Translational Coupling

18400178b Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 13, No 9, Sep 87 (manuscript received 31 Dec 86) pp 1186-1193

[Article by V.V. Kravchenko, I.P. Gileva, V.V. Shamin, V.A. Kulichkov, V.N. Dobrynin*, S.A. Filippov*, S.A. Chuvpilo* and V.G. Korobko*, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast; *Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Dose effect is one of the more efficient measures that may be utilized to ensure an increase in a gene product, an approach taken to study the effects of duplication of an artificial gene for human leukocytic interferon (IFN) within plasmids on their expression in E. coli. Duplication of the gene was attained with a chemically synthesized adapter designed so that the terminator of translation of the first gene (TAA) is within the SD sequence (TAAGGA) of the second gene and 11 bp from the new translation starting site. In another system, the terminator for the first gene was located 69 bp from the initiation region of the second IFN gene with the same SD segment. In this manner a series of recombinant plasmids was produced containing the duplicated IFN genes in tandem controlled by promoters p_{lac}, p_{VIII}, and p_{trp}. Analysis of the expression rates in E. coli cells showed that high levels of synthesis were secured with bicistrons of IFN gene under the control of p_{trp2} and p_{VIII} in polycistrons trp-L-IFN gene-IFN gene and IX-VIII-IFN gene-IFN gene, containing a coupling system for all of the genes. However, extremely low levels of IFN synthesis were seen with systems in which the bicistron was under control of p_{lac} in which translational coupling applied only to IFN genes. Figures 5; references 19: 7 Russian, 12 Western.

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Construction of Artificial Hybrid Operons With Partially Overlapping Genes for Expression of Heterologous Genes in Escherichia Coli Cells

18400179a Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 21, No 5, Sep-Oct 87 (manuscript received 9 Feb 87) pp 1297-1309

[Article by S.V. Mashko*, A.L. Lapidus*, M.E. Trukhan, M.I. Lebedeva, S.M. Podkovyrov, M.V. Kashlev, A.V. Mochulskiy, M.R. Yeremashvili, L.S. Izotova, A.Ya. Strongin*, M.A. Skvortsova, V.E. Sterkin, A.N. Lebedev, B.A. Rebentish*, Yu.I. Kozlov*, G.S. Monastyrskaya, S.A. Tsarev, Ye.D. Sverdlov and V.G. Debabov*, *All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms, Moscow; Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted on a novel approach to enhancing the expression of heterologous genes in bacterial cells, which consisted of the construction of artificial hybrid operons with partially overlapping genes. In a model system designed for the expression of the human leukocytic interferon gene in E. coli, partial overlap of the termination and initiation segments of the cistrons in the hybrid operon ensured enhanced translation of the corresponding genes, or translation coupling. Thus, interferon synthesis in E. coli containing plasmids with lacUV5 promoter was on the order of (3-4) x 10^7 U/ml, or (9-15) x 10^3 alpha-interferon molecules per cell. In E. coli cells containing plasmids with the tac promoter, (1-2) x 10^8 U/ml interferon were produced, or 6 x 10^4 interferon molecules per cell. Additional experiments indicated that reinitiation of translation occurred in the intercistronic region in the case of the second gene of the hybrid operon. Furthermore, use of the E. coli trpE-trpD

intercistronic region led to equimolar synthesis of the products of genes distal and proximal to the hybrid operons. The use of artificial hybrid operons appears to represent an efficient system for constructing universal vectors for ensuring expression of cloned foreign genes in bacterial cells. Figures 5; references 35: 12 Russian, 23 Western.

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Efficiency of Translational Coupling in Hybrid Operons

18400179b Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 21, No 5, Sep-Oct 87 (manuscript received 9 Feb 87) pp 1310-1321

[Article by S.V. Mashko, A.L. Lapidus, M.E. Trukhan, N.A. Stashchuk and V.G. Debabov, All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms, Moscow]

[Abstract] The efficiency of translational coupling was monitored in the case of hybrid operons containing partially overlapping genes, using a model system consisting of the gene for the N-terminal portion of the cro protein of phage lambda and the gene for E. coli chloramphenicol acetyl-transferase (cat). To study the level of translational coupling efficiency in relation to the intercistronic region a scheme was devised for the construction of recombinant plasmids designated pPR45 and pPR46, containing the hybrid operons cro'-cat' with partially overlapping genes. The E. coli system was then analyzed for the level of cat activity. The data showed that the efficiency with which a gene distal to the promoter was expressed was indeed dependent on the structure of the intercistronic segment. Translational coupling was optimum when the initiation region for the distal gene of the hybrid operons showed UGA AUG-type overlap of the AUG codon with the terminating codon of the proximal gene. A shift of the UGA triplet several nucleotides to either side diminished the efficiency of initiation of translation for ribosomes synthesizing the protein of the first gene. Figures 4; references 14: 4 Russian, 10 Western.

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Prediction of Exposed Amino Acid Moieties in Globular Proteins in Relation to Protein Engineering

18400179c Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 21, No 5, Sep-Oct 87 (manuscript received 17 Jul 86; in final form 30 Mar 87) pp 1422-1425

[Article by M.A. Rodionov, S.G. Galaktionov* and A.A. Akhrem, Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk; *All-Union Scientific Research Institute of Industrial Microbiology, Minsk]

[Abstract] An algorithm has been proposed for deriving self-consistent exposition indices for amino acid moieties in globular proteins on the basis of amino acid sequence. Empirical parameters used in the study were obtained from x-ray analyses of 64 nonhomologous proteins in the Brookhaven Protein Bank, and applied to an additional six proteins not included in the bank. Regression equations were obtained separately for the various types of amino acid moieties, depending on the type of secondary structure (alpha-helix, beta-pleated sheath, unordered fragment). Calculation of mathematically and experimentally derived exposure parameters (q_i) for the six proteins (2 immunoglobulin fragments, subtilisin, myoglobin, lysozyme, azurin) yielded coefficients of correlation of 0.59-0.76, with standard deviations of 0.15-0.16. The procedure was applied to identification of amino acid moieties and bonds subject to primary attack by trypsin-like enzymes. In the case of interleukin-I the most accessible moiety was Arg-62. These findings suggest that it may be possible to engineer interleukin-I analogs showing greater resistance to proteolytic attacks and characterized by longer physiological half-lives. Figures 1; references 21: 2 Russian, 19 Western.

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Prediction of Threshold Limits for UHF Fields in Sanitary Regulations

18400191 Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 87 (manuscript received 17 Jun 86) pp 40-42

[Article by Yu.D. Dumanskiy, D.S. Ivanov, K.G. Yevreinov, N.G. Nikitina, V.N. Soldatchenkov and L.A. Tomashevskaya, Kiev Scientific Research Institute of General and Communal Hygiene imeni A.N. Marzeyev]

[Abstract] A mathematical analysis was undertaken of the prediction of threshold limits for UHF fields, taking into consideration actual exposure conditions of radar operators and complications introduced by spatial and temporal discontinuities in emission. The analysis proceeded from the fact that in the West threshold limit values are based on the energy that is absorbed and heat that is released by the body into the environment. The maximum amount of heat that can be emitted by the human body has been calculated at approximately 243 W/sec. Since under conditions of intensive physical exertion the human body can release ca. 194 W/sec (or ca. 4000 kcal/day), these calculations indicate that additional heat release due to UHF irradiation would have to be limited to 49 W/sec to maintain normal body temperature. Otherwise, the thermoregulatory mechanism would be overtaxed and hyperthermia would set in. On the basis of these considerations it is possible to estimate permissible energy flux densities for this category of electromagnetic fields. Analysis for wavelengths limited to the 0.8 [is less than or equal to] β [is less than or equal to] 36 cm band led to predictive values for threshold limits, which were then compared with tabulated threshold values in force. Good agreement was obtained between both sets of data, indicating the utility of threshold limit values based on spatiotemporal discontinuities and body heat capacity. References 4 (Russian).

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Opioid Peptides and Neurohormonal Reactions in Stress and Adaptation

18400200b Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 6, Nov-Dec 87 (manuscript received 13 May 86) pp 51-53

[Article by Yu.B. Lishmanov, L.V. Maslova, A.N. Tsibin and Zh.V. Trifonova, Laboratory of Radionuclide Study Methods (Chief Yu.B. Lishman), Siberian Branch (Tomsk) of All Union Cardiologic Scientific Center, USSR Academy of Medical Sciences]

[Abstract] Blood levels of β-enkephalin and other hormones were determined during stress and adaptation periods; the effect of administration of a stable analog of leu-enkephalin on the level of stress hormones was investigated on white rats. It was shown that stress leads to a significant elevation of β-enkephalin levels and other changes in blood hormones. Preliminary adaptation of experimental animals with short term stresses resulted in a moderate elevation of immunoreactive β-enkephalin and prevented its further elevation during the actual stress. Adaptation and prophylactic injections of enkephalin diminished hormonal response to stress. Hence, such prophylactic injection of opiate receptor ligands and preliminary adaptation by short term training should prevent pathogenic effects of stress. References 12: 9 Russian, 3 Western.

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Opioid Peptides and Shock

18400200a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 6, Nov-Dec 87 (manuscript received 18 Jun 86) pp 47-51

[Article by G.N. Kryzhanovskiy, V.O. Slepushkin, G.K. Zoloyev, V.N. Yelskiy and M.I. Titov, Scientific Research Institute of General Pathology and Patologic Physiology, USSR Academy of Sciences, Moscow; Siberian Branch (Tomsk) of All Union Cardiologic Scientific Center, USSR Academy of Medical Sciences, Donets Medical Institute]

[Abstract] The role of neuropeptides in shock was studied in an attempt to explore the possibility of using synthetic enkephalin analogs in treatment of shock. Experiments were carried out on rats which were subjected to traumatic and hemorrhagic shock. During the shock period the blood levels of β-enkephalin became higher while those of leu-enkephalin decreased. Administration of enkaphalin during shock led to normalization of hydrocarbon, lipid and electrolytic metabolism. Microcirculation improved significantly. Administration of dalargin during shock normalized activity of the hypothalamo-hypophyseal-adrenal system by lowering their hyperenergetic reactions. Thus, it was shown that dalargin initiates a multifactorial process resulting in decreasing hyperactivity of the sympathetic adrenal system which in turn slows down the other hormonal processes leading to normalization. Synthetic ligands of the opiate receptors could be considered as promising agents in treating shock. References 16: 14 Russian (1 by Western author), 2 Western.

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Pharmaceutical Incompatibility in Prescription Drugs Filled in Drug Stores

18400202b Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 9, Sep 87 (manuscript received 12 Jan 87) pp 47-50

[Article by L.I. Kirichenko, L.V. Polyakova and A.I. Bondarenko, docent, Republic Analytical-Control Laboratory, Department of Drug Technology (Director Ye.K. Pilko), of the Belorussian Institute for the Advanced Training of Physicians]

[Abstract] About 3,000 prescriptions were collected from various Minsk drug stores and checked for component compatibility using the automated program "Gamma FN-1." A large number of them were found to be totally incompatible, leading to precipitation of active agents from solutions, discoloring and deactivation of some agents. Various types of incompatibilities are tabulated, listing the ingredients. Several cases were noted in which the specific drug combination should not have been prepared at all. A short discussion of the possible resolution of this problem is included. References 1 (Russian).

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Hygienic and Biomedical Aspects of Environmental Contamination With Radioactive Cesium-137

18400202a Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 9, Sep 87 (manuscript received 13 Mar 87) pp 44-47

[Article by V.I. Ternov, Belorussian Institute for the Advanced Training of Physicians]

[Abstract] Of the 35 isotopes of cesium, the most dangerous is the radioactive Cs-137 isotope because of its long half-life and high yield from various nuclear breakdown processes. It is a beta particle emitter and it can be found just about everywhere in the environment. Environmental contamination with Cs-137 is the result of nuclear explosions (mostly military); contribution from normally operating nuclear plants is negligible. Cs moves along the food chain and thus can enter the human body. The effect on the human body depends on the level of its accumulation in the soil, plants and vegetables, nutritional regimens etc. Once Cs-137 has entered the body, it is distributed rather uniformly throughout the body via the blood stream. Its excretion occurs via the kidneys and the gastrointestinal tract; half of this material is excreted from the human body in 25 to 160 days. Biological activity of Cs-237 has been adequately studied only in animals; human data are extremely limited. Protective measures should be applied only when Cs-137 levels reach the dangerous levels and then they should be directed at minimizing Cs entry into the organism, i.e., the measures are quite individualistic in nature. References 29: 26 Russian (2 by Western authors), 3 Western.

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Study of Antishock Efficacy of Anabol in Irradiated Animals

18400200c Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 6, Nov-Dec 87 (manuscript received 26 Nov 86) pp 53-55

[Article by V.S. Nesterenko, L.N. Chureyeva, A.V. Piskarev, V.A. Yakovlev, I.A. Matveyeva, S.M. Spivak and V.I. Ogarkov (Deceased), Modelling Laboratory of Radiation and Non-radiation Effects (Chief R.S. Budagov), Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk; Laboratory of Immunochemistry (Chief M.V. Dalin), All Union Scientific Research Institute "Biotekhnologiya," Moscow]

[Abstract] Shock control during radiation trauma has not been achieved as yet due to its multicomponent nature. One possible direction to solving this problem is to look for agents and methods to increase nonspecific resistance of various organ systems. The effect of one such agent, anabol (isolated from the membranes of Lactobacillus bulgaricus), was studied on rats and mice. Experimental data showed that this agent produced the desired effect on survival of animals in shock and restoration of their arterial pressure. It had no undesired effect on the circulating blood volume, it did not alter pain sensitivity of the animals and did not show any toxic manifestations. However, its mechanism of action is not clear and this requires further studies. References 12: 5 Russian, 7 Western.

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